Surface Water Impacts

Groundwater pumping is substantially impacting streamflows and water levels in lakes and wetlands in parts of Wisconsin. This issue differs from the large regional drawdown issues in the northeast and southeast, where water level declines are mainly in the confined or semi-confined systems not well connected to surface waters.

Central Sands

The problem has been well documented in the central sands region of the state (parts of Portage, Waushara, Waupaca, Adams, and Marquette Counties), where 20% of the state's groundwater is pumped from several thousand high capacity wells, predominantly for irrigation. Dozens of lakes and potentially hundreds of stream miles may be affected. Some lakes have completely dried, most notably Long Lake near Plainfield. Others have suffered varying degrees of ecological impacts. Recreation has been impaired, for instance, in Portage County where the county swimming beach at Wolf Lake has been closed for about 8 years. The Little Plover River, a Class I trout stream and Exceptional Resource Water in Portage County, has dried in parts during various years since 2005.

Statistical approaches and groundwater flow modeling indicate that area streams and lakes would have had continuous and healthy flows and water levels in the absence of groundwater pumping in the area.

With financial support from the DNR, the Wisconsin Geological and Natural History Survey constructed a groundwater flow model for the Little Plover River watershed in Portage County. This model is a scientific tool for understanding the complexities of geology, groundwater recharge and discharge, surface-water flow, well development and use, and water balance. The model simulates the complex temporal and spatial interactions among streamflow, pumping, and climate and also provide users "what-if" evaluations of possible decisions involving management of water use or land-use changes. The Little Plover River Basin was chosen for this pilot study because the river has been the focus of recent management concern and because a great deal of hydrogeologic data already exists for this area. (https://fyi.uwex.edu/littleplovermodel/files/2014/08/Little-Plover-River-handout.pdf)

Several of the GCC agencies are participating in a Wisconsin Institute on Sustainable Agriculture (WISA) consortium (http://wisa.cals.wisc.edu/current-projects) to help understand the potential impacts of irrigation pumping on lake levels in Wisconsin's Central sands region.

Dane County

Although groundwater and surface water resources are plentiful in Dane County, there several well documented cases of impacts to surface water due to groundwater withdrawals. Just as regional drawdowns have developed across Dane County in response to high-capacity pumping of groundwater for municipal and industrial supply (*http://dnr.wi.gov/topic/groundwater/documents/GCC/GwQuantity/RegionalDrawdowns.pdf*), several smaller streams and spring systems have also been impacted over the past several decades resulting in reduced flow rates.

Some of the most significant impacts have been to Starkweather Creek on the east side of Madison as well as springs along the south shore of Lake Mendota, north shore of Lake Wingra and around lake Monona. Baseflow in Starkweather Creek has decreased as stormwater is

diverted from impervious areas to drainage ditches and high-capacity pumping lowers water levels. At Springhaven Pagoda, which was built in the late 1800's to house a spring near the shore of Lake Monona, the spring has stopped flowing entirely. At Merrill Springs, near Spring Harbor along the south shore of Lake Mendota, a spring pool that was built in the mid-1930s has decreased its flow by upwards of 90% (http://www.springharboronline.com/where-are-the-springs-in-spring-harbor.html). The reduction in these surface water flows is considered to be due to decreases in recharge from urbanization and, even more importantly, the result of regional drawdowns from pumping high-capacity wells.

The Dane County groundwater flow model, which is calibrated based on observed water levels in wells and lakes, as well as flow rates in streams and springs, has provided further evidence of impacts to surface water along the Yahara River corridor. Model simulations over the past decades have consistently shown a reversal in groundwater flow along the southern two-thirds of Lake Mendota and all of Lake Monona. The result is that lakes that historically gained groundwater now lose water to the groundwater system. This reversal, which is due primarily to the concentration of high-capacity wells in the greater Madison area, has effectively drawn groundwater levels down in wells and impacted flows in sensitive stream and spring systems which are replenished by shallow groundwater supplies.

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